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ABSTRACT

An analysis of phonetics and Chinese character learning done with 1928 character frequency data was reproduced with a more modern data base. The study tabulated the 500 characters of the Elementary Chinese Reader, volumes 1 and 2, and supporting statistics to analyze the characters' phonetics by microcomputer. The objective was to find phonetic clues and patterns to facilitate learning those characters and others in Chinese. Cognates were sorted into categories and rules were formulated for phonetic transformations. The completed analysis revealed a number of phonetic patterns felt to be useful to Chinese language learners and supports the phonetic approach to Chinese reading and writing instruction. The report includes character lists and statistics from the study. (MSE)

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THE ECR 500, A SOUND APPROACH

By: Charles J. Alber

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The ECR 500, a Sound Approach

by Charles J. Alber

Computers in general and the word processor in particular are creating a revolution in Chinese studies. From now on research papers studded with Chinese characters will no longer be a problem - either for the authors who write them or the journals that publish them, even when traditional and simplified characters are mixed! But the computer and the wordprocessor have revolutionary implications for language teaching as well. Before the only directions we gave students were the correct stroke order and the number of strokes. Now we can harness the awesome memory of the micro-computer to teach both the reading and writing of Chinese characters. We can accurately determine the number of most commonly-used characters, analyze them systematically, assign the phonetics and significs to appropriate categories, and by so doing facilitate the whole process of learning the language.

In his new book The Chinese Language, Fact and Fantasy, John DeFrancis points out that "the phonetic element in Chinese characters has frequently been overlooked despite the fact that many scholars, both Chinese and Western, have drawn attention to its crucial role in Chinese writing(1)." (In my opinion, not even the significs or meaning elements have been given the attention they deserve. Usually, students are expected to learn characters through brute memorization.) But then, the author carries his argument a step further by investigating the frequency of the phonetic elements. He concludes that "if a reader of Chinese knew only a hundred characters, almost every other character [i.e., 50%] in a piece of writing would be familiar to him. With a knowledge of 1,100 characters, only every tenth character would be unfamiliar, and in two-thirds [i.e., 66%] of the remaining 90 percent of the characters there would be a useful phonetic clue to help the reader recall the pronunciation of the character. ... Thus a reader with a knowledge of the phonetic component in Chinese writing has two chances out of three of guessing correctly the pronunciation of any given character he is likely to encounter in reading(2)." Unfortunately, DeFrancis' data base, "a cross section of 500 characters out of the 4,719 different characters that were found to occur in a frequency count made by Chen Heqin in 1928 (3)," is somewhat outdated. Furthermore, DeFrancis has not considered the problem of simplified characters and cannot determine "what difference, if any, exists between ... complex characters and the simplified characters now used in China (4)."

My aim, therefore, has been to reproduce DeFrancis' experiment but with a more modern data base. With the help of an Eastern Computers, Inc. wordprocessor, I have tabulated the 500 characters of the Elementary Chinese Reader, vols. I and II, along with various supporting statistics. I chose this series because it is the most systematic and comprehensive of those published on the mainland. Presumably the 500 characters are among the most commonly-used, but there are no statistics regarding frequency of occurrence. This makes comparison with DeFrancis' sample a bit more difficult, but by no means impossible. I have also used the 850 phonetics identified by Wieger (5) (supplemented by those in Karlgren's Analytic Dictionary [6]) rather than the 895 suggested by Soothill, but this would seem to be of minor consequences. Ideally, the fewer phonetic series the better, as long as the phonetic

element or grapheme in each character is substantially the same.

Of the ECR 500, no less than 135 (27%) are so-called independent phonetics, characters which function as phonetic elements but which also have an independent existence of their own. (The 马 ma in 妈 ma, for example.) In the DeFrancis sample only 91 out of 500 or 18.2% are independent phonetics (7). This is because a large part of the sample, about 60% of the characters, fall into the less commonly-used category. Low frequency characters seem to contain more phonetic compounds but fewer independent phonetics. The more seldom you see a character the more you need a clue to its pronunciation. Conversely, the more frequently a character is used, the more useful it is as a phonetic element.

For much the same reasons, only about 35% of the characters in the ECR 500 fall into the category of a phonetic compound in which the phonetic (in my judgment) forms an acceptable clue to the compound, whereas in the DeFrancis sample this number is closer to 50%. Some of the disparity can be explained by differences in sample. As mentioned earlier, the DeFrancis sample includes fewer commonly-used characters and hence more phonetic compounds. As for the ECR 500, about 5% of the characters have been simplified to the point where even the phonetic has been lost. Beyond that, however, there may simply be differences as to what constitutes a "useful" phonetic. Soothill seems to have placed characters in certain phonetic groupings with very little justification at all. For example, the numbers 一 , 二 , 三 are all listed in the same phonetic "series" (8).

Even so, using the ECR 500 sample, when we add the independent phonetics (135, 27%) to the phonetic compounds (175, 35%), the aggregate is 62%, close to the two-thirds ratio which DeFrancis says applies even to the ten percent of characters with a lower rank frequency than 1,100 (9). It would seem, therefore, that even among the ECR 500 two of every three characters have a useful phonetic. But this is deceptive. An "independent phonetic," or even a phonetic compound for that matter, remains independent until another character in the series appears. It makes no sense to talk about a phonetic "series" unless there is more than one character in the series. The question, therefore, is what constitutes a phonetic series and just how many of them are there?

Phonetic series tend to be rather amorphous entities. Which is to say, that various authors have established various lists of phonetics. For example, Soothill has a different series number for 有 you (184), 友 you (188), 又 you (532) and 右 you (181). Karlgren lists them all in the same series. Wieger lists 右 (172) and 有 (258) but not 又 or 友 . Both Karlgren (K952, K953) and Soothill (451) recognize 大 da and 太 tai as phonetics. Soothill lists them under the same number, but Karlgren merely mentions in passing that the two are etymologically and phonologically related. For some reason or other, neither character can be found in Wieger. An even more representative example might be Karlgren's Grammata Serica (18), series 81, which includes the characters 可 ke, 哥 ge and 阿 a. In his Analytic Dictionary, however, the three characters are listed in two different series (413 and 414), only 可 and 阿 being listed together. 哥 forms its own independent series, as also does 阿 ?

The truth is that a given phonetic series is generally a continuum

and breaking it at one particular point can often be purely arbitrary. Should 翻 fan and 播 bo be in the same phonetic series because they have the same phonetic element or should they be in separate series because of the radically different pronunciation? If they should be included in the same series, then why not also 審 shen (simplified 审)? There may be difficulties in establishing any standard "syllabary," as DeFrancis suggested. What we need even more is a set of rules which will enable students of the language to predict the more common transformations. The first step in the rule-making process has already been taken - that of tabulating the most common phonetic sequences. But we must not be trapped into thinking they are carved in stone. The studies of Soothill, Wieger, and Karlgren are only the first steps in understanding the phonetics of the language.

II.

As mentioned earlier, the most common category of phonetics is the cognates, characters whose phonetic element is identical, or almost identical, to the compounds whose pronunciation they are intended to suggest. (I say "almost identical," because in most instances we cannot look for identity in tone. The tones, as DeFrancis has already discovered, "are the primary casualty in representation of Chinese by syllabic signs, as they are in representation of Chinese by Western phonemic transcription that indiscriminately writes ui for ui, ui, ui, ui"(11).) As a result, when we look at the cognates in the ECR 588, we discover that there are a large number indeed.

To better understand the problem, I have sorted the cognates into several categories. The first (homonyms in series, 1.8-8.8) is those which are represented by more than one character in a series, like 巴 , 吧 , 把 , and 爸 . Not only does the phonetic element appear in the series but there is at least one other homonym, sometimes several. The 72 category one cognates in our sample comprise about 15% of the total. In most cases the independent phonetic is graphically identical to that in the compound, there being only a few exceptions, e.g. 十 , 士 , 世 and 使 , 事 . A note on these variations may suffice to help the student, although they may need to be placed in a separate category.

Category two (undeveloped homonyms, 1.81-7.81) is much like category one, except that there is only one character present from a potential series, whether that character is itself an independent phonetic or not. For example, the character 饭 fan apppears in a phonetic series (88855), but among the ECR 588 there are no other homonyms to fill out the series, nor does the independent phonetic 反 fan appear. The series, therefore, remains undeveloped, and the character, whatever its potential, remains as an isolated character in the series. The phonetic element may be homophonous with the compound, but at this stage in the learning process, this is of limited significance. There are 42 such undeveloped compounds in this category, a total of 8.3% of the ECR sample.. If added to the category one cognates, the total of useful phonetics would swell to nearly 23%, almost one character in every four. But since these phonetic elements are undeveloped, they are of little or no value to the student, and should not be construed as "useful."

There is at least one other category of cognates (homorganic in

series, 1.821-7.821) which may be called homonyms, although strictly speaking they are not the same sounds. Among the characters which begin with an aspirated consonant there is often an unaspirated counterpart. (For some reason or other, the Chinese do not always distinguish the two phonetically.) For example, we have 巴 , 吧 , 把 , 爸 - all pronounced [ba], but then suddenly 爬 [pa]. The same grapheme is used to designate two distinctly different sounds. There are a fair number of such characters whose pronunciation is easily predicted if one knows even the first two columns of the Chinese phonetic alphabet - b/p, d/t, z/c, zh/ch, j/q, g/k. Unfortunately, not all of these phonetics are developed. One could easily predict the pronunciation of 姐 jie from its phonetic 且 qie, but this character does not appear in the ECR 500.

Sometimes a series covers the whole row of initials on any given line of the phonetic alphabet. For example, 工 gong, 空 kong, 红 hong is a series that can be found even in the small sample of the ECR 500. ... If the student memorizes the whole of the phonetic alphabet, he will have a reasonable chance to guess the pronunciation of the 42 characters in this category. The developed homorganic cognates comprise about 8% of the ECR 500 and bring the total percentage of readily recognizable characters to a minimum of 23%.

The most radical changes we have seen in this group of so-called cognates has been in the initials. But a variety of phonological changes are possible, even among sounds that are basically homorganic, i.e. produced by the same speech organs in the same position. The differences in phonetic and compound may be slight, e.g. 北 (bei, bi), 冷 (leng, ling), 讲 (jiang, jing) - in which case the pronunciation can be easily remembered. Or the two sounds may be radically different, to the point that not even a knowledge of the phonetic alphabet will suffice. Changes in both the final as well as the initial may combine to render the would-be phonetic almost useless. It is not too difficult to see that 冬 dong (winter) is the phonetic in 疼 teng (hurt), for example. But how about 图 tu? Does the phonetic 番 fan really provide a clue to 播 bo? If so, then what about the phonetic 昔 xi in 借 jie or 错 cuo? For convenience I have divided this group of irregulars into two categories, those in which only minor changes (1.831) have taken place and those where major transformations (1.832) have occurred. There are 48 characters which fit into this category, about 10% of the characters in our sample. But only 29 of them can be regarded as "useful" phonetics. Adding these to the number of cognates brings the total of readily recognizable characters to 28.4%.

In Chinese, the term phonetic alphabet often refers simply to consonants, not to vowels or semivowels. As it happens, the number of characters in our sample that begin with a vowel is miniscule, and most of them (安 , 按 , 阿 , 啊) can be considered cognates (8.8). So, temporarily at least, this does not present a major problem. But a large number, no less than 10% of the characters in the ECR sample, begin with a semivowel, specifically a [y] or [w]. Except that [y] and [w] do not appear anywhere in the phonetic alphabet, they act like any other initial. Not only are there homonyms which begin with semivowels (元 , 远 , 园), but the two initials alternate with one another? For example, there is 完 wan (to finish) but 院 yuan (yard); 玩 wan (to play) but 元 yuan (dollar). The phonetic element is the same, but there are two distinctly different pronunciations. The analogy to 巴 ,

吧，把，爸 and 爬 seems compelling.

To the six categories of cognates, therefore, we can add all those which begin with a semivowel (cf 7.8, 7.81,), except for those in the undeveloped (7.81) category. The w/u alteration can be added to the category of homorganic cognates in series. As for the irregular category (7.831), none of the phonetic elements are distorted beyond recognition. All of them provide a "useful" clue to the pronunciation of the compound, but few of them are part of any developed series. The number of cognate semivowels is, therefore, fairly limited in number.

Aside from those I have labled cognates, there are other phonetic elements which provide a "useful" clue to the compound. The problem is, however, that there is no readily available device like the phonetic alphabet to help the student remember them. He or she will have to study the various categories of phonetic transformations, or consonant shifts as they are sometimes called, and learn to recognize them, just as we have done in the case of the semivowels.

III.

At this point the guessing game admittedly becomes a bit more complicated. Even so, since the phonetic transformations are often regular, rules can be formulated. Discovering the rules will depend to a large extent on statistical evaluation, but there are rules to discover. Grimm's discovery that Latin "duo" corresponds to English "two," "labium" to "lips" and "genus" to "kin" is no fairy tale (12). In fact, we can observe the same "consonant shifts" in Chinese, a fact which should help dispel the notion that Chinese is an "exotic" foreign language, totally unlike any other.

Historically speaking, we find "sufficient conformity between phonetic and compound to ensure ... identical or at least cognate initial consonant, head vowel and final consonant....(13)" But this is not always the case. The most sensitive area of the Chinese phonetic alphabet, the part where we can expect the greatest amount of interchange, is the so-called prs (palatal-retroflex-sibilant) triangle - j/q/x, zh/ch/sh/r and z/c/s. From the point of view of Modern Standard Chinese (MSC), these three groupings represent some fundamental distinctions. But in various "dialects" they obviously become confused.

We are all familiar with Southerners who say /si/ instead of /shi/. In fact, there are numerous jokes about it. Frequently we hear "cifan" instead of "chi fan," "zidao" instead of "zhidao," "Zongguo" instead of "Zhongguo." Experts tell us (14) that the retroflex and sibilants are completely confused in some dialects (including the Shanghai, Suzhou, Guangzhou, Hankou and Chengdu areas) and partly confused in others (Tianjin, Yinchuan, and Xian). Even in our sample (4.3), there are a few characters which fit this description.

The same is true of the sibilants and the palatals. Although in MSC they are in complementary distribution, speakers of certain dialects, where "sharp" vowels follow the sibilants, tend to palatalize them. "The sharper sounds, though no longer existing in Peking dialect, are still common in many Mandarin dialects as well as in Peking opera (15)." A practical example of this is the word 百事可乐, which is MSC for Pepsi Cola. Obviously, "baishi kele" sounds quite dif-

Although each category is rather small, there are a total of 29 consonat variations. This would increase the number of usable phonetics from 28.4 to 34%.

IV.

As mentioned above, in the majority of phonetic compounds, we find "sufficient conformity between phonetic and compound to ensure ... identical or at least cognate initial consonant, head vowel and final consonant....(17)" There are some instances, however, where the phonetic begins with a semivowel but the compound begins with a consonant. The character 也 ye, for example, is the phonetic in 他 ta and 地 di. But when we examine the series from which the phonetic comes, usually only one class of initials predominates. In many cases, therefore, we can determine the identity of the lost initial. In the case of 也 there is a missing dental, which Karlgren carefully records (< d) in his analytical dictionary. Knowing that the archaic pronunciation of 也 was *dia, makes it easier to understand its relationship to 地 di, and even to 他 and 施 .

The disappearance of the initials [j] (k in Karlgren's annotation) and [g] from the consonant cluster [gl] and [jl], for example, helps to explain an otherwise puzzling alteration that appears several times in the ECR 588. 监 jian is the phonetic in 蓝 lan (blue), 篮 lan (basket), and 览 lan (observe). In the newly simplified characters 炼 lian and 练 lian, the phonetic is a deceptively appreviated 东 , although it may look like 東 (东) dong. To this group (5.2) also belongs the character 路 lu, which has an even more mysterious phonetic 各 (from initial gl). The alterations here (gl, jl > l) are similar to those (g / j) noted above, except that previously no consonant cluster was involved.

The disappearance of the initial [m] in the cluster [mw] helps to explain another category (1.3) of phonetic compounds. For example, 亡 wang (to perish) is the phonetic in 忙 mang (busy); 未 wei (not) in 妹 mei (younger sister); 免 mian (avoid) in 晚 wan (evening), and 门 men (door) in 问 wen (to ask). To this should be added the character 留 liu (2.3), which has the phonetic 卯 mao. Here the consonant cluster [ml] is reduced to [l].

The tracing of lost consonants is not always a rewarding pursuit. Witness the phonetic 㕣 yan, which is regarded as the phonetic GS228 in the characters 铅 qian (lead) and 船 chuan (boat). It is no help to the student to know that the Archaic pronunciation of all three characters was *diwan. Karlgren GS228a notes that the Peking reading 铅 k'ien (qian) is an anomoly and that we should expect a yuan. But how then did the new initials (q/ch) develop?

The following are all of the phonetic compounds which begin with a consonant but have a phonetic element which begins with the semivowel [y] (7.78)

d, t, n	q	x
地	铅	笑
谈 , 踢		
暖		
	ch	sh
	船 , 场	烧 , 舒 , 说

ferent than "Pepsi Cola." But when we consider that Pepsi was first introduced to China through Shenzhen in 1982, there is less of a mystery. My Cantonese friends assure me that "baishi hele" in their language sounds more like "baksi hele" or the even closer variant "bopsi hele." The sharper vowel makes the word 事 shi seem already half palatalized.

There are a whole series of characters in our sample (4.5, 5.4) where the phonetic element begins with a retroflex consonant but the compound is palatal. For example, 争 zheng is the phonetic for 净 jing (clean) and 静 jing (quiet); 只 zhi is used for the phonetic in 积 ji (gather, store); 支 zhi the phonetic in 技 ji. It would help the student to know that in Min literary pronunciation of 只 (and 支) is zi (18) (IPA tsi) and the pronunciation of 争 is zing (IPA tsing).

These unfortunate choices of phonetic seem to militate against any real standardization of the language, but it seems that the same exchanges take place in traditional as well as simplified characters. For example, 汽 qi (乞 Min kit) and 吃 chi (Min kit) share the same phonetic. And the fricatives (sh, x) in these two classes (palatal and retroflex) interact much the same as the affricates (zh/ch, J/q). Hence, 生 sheng (Min sing) is phonetic in 星 xing (Min sing), 社 she (Min sia) in 谢 xie (Min sia), and 小 xiao (Min siao) in all likelihood the phonetic in 少 shao (Min siao). It helps to know that in Minnan literary pronunciation, if not in MSC, all of the above-named characters are homonyms. The student needs to be aware that even among the ECR 500, thirteen characters (4.5, 5.4) are affected by such an exchange of consonants. Interestingly enough, the confusion seems to include also the velar sounds. ... Since the character 行 xing (Min hing) has the alternate pronunciation hang, it is also included in this category.

Certain words that begin with retroflex initials in Mandarin become dentals in the literary pronunciation of Minnan dialect. For example, MSC 沾 zhan (to soak) is pronounced diam. This confusion is perpetuated in a number of characters (4.4), including three very common ones - 店 dian (shop, hotel), 点 dian (point, o'clock) and 站 zhan (to stand, a station). Knowing that an alteration between zh/d takes place, a student should be able to cope with similar pairs like 重 zhong (heavy, Min diong) and 懂 dong (to understand, Min dong), 者 zhe (one who) and 都 dou (all).

Some Mandarin palatals become velar in Minnan. Hence, 巨 ju is pronounced gu (no literary pronunciation provided). This may help to explain why 巨 ju is the phonetic in 柜 gui; 圭 gui is the phonetic in 街 jie (street, Min gai); and 古 ku (ancient), the phonetic in the newly simplified character 剧 ju (drama, Min gik, giok). Although there are only three characters in our sample (8.2) with this consonant variation, more can be expected. Of course, we cannot help but wonder if 见 jian (Min gian) is meant to be the new, albeit distorted phonetic of 观 guan.

Consonant Alterations	
zh / z, d (t), J	18
ch / q	1
sh / x	6
g / J	3
Total	29

The variety of missing consonants in MSC is limited enough, but there is no consonant in the phonetic to supply a hint. The student must supply his own consonant. Whether the phonetic can still be classified as "useful" probably would depend on the frequency of usage. No doubt the student could remember 地 di, 谈 tan and 说 shuo. But how about 场 chang or 烧 shao?

To this category also should probably be added the characters 你 ni and 恁 nin (7.782), where through a bizarre evolution the dipthong [nz] is said to have evolved into [er].

A parallel problem exists in compounds which begin with a semivowel but have phonetics that begin with a consonant (7.71). The character 椅 yi (chair), for example, has the phonetic 奇 qi (strange). The phonetic may be only an approximation because of its role as a cosignific, a chair being "an unusual piece of wood" to someone who has never seen one. In any case, Kargren GSI gives no indication (=ia) of a missing consonant in the phonetic element. Whether there was or was not a consonant in archaic Chinese is not terribly vital from the student's point of view. He or she need only remember that all compounds in this classification lose the consonant and revert to the semivowel [y]. The only three characters in this category thus far are 椅 yi, 影 ying, and 用 yong. And the superfluous consonants fall into a surprisingly narrow range (j, q, zh).

Consonant Cluster Alterations		
	mw / m, w	4
	ml / l	1
jl, gl / l		7
	nz / n, er	2
Total		13

Although the number of changed consonant clusters is small, they are as predictable as other alterations. Adding them to the list of usable phonetics increases the total to 37%.

Consonant/Semivowel Alterations		
compound	phonetic	
+ consonant	- consonant	14
- consonant	+ consonant	8
Total		22

This final group of characters where the initial consonant has disappeared either from the phonetic element or the compound is rather large. Adding them to the list of useful phonetics would bring the total to 41%. Since a variety of initial consonants tend to disappear, one might argue that this category is no longer useful, particularly to the beginning student. This remains to be determined. The missing consonants tend to be either dental or pre-palatal. A larger sample could make it possible to predict the missing consonant with some degree of accuracy.

If we add together all the characters in the ECR 500 sample which have some kind of phonetic pair and compounds which have a discernable phonetic element, the total is about 55%. If we could include all the independent phonetics (which will eventually become phonetic elements in some particular series) in this figure, the total would be closer to 70%. But with no other character, or even a phonetic element, to compare, we no longer have a phonetic "series."

Some independent phonetics and compounds remain undeveloped (1.81-8.81). They may have discernable phonetics, but these phonetics do not appear in the ECR 500. Although the undeveloped phonetics are clearly more useful than those which show no phonetic at all (1.82-8.82), neither group (in my opinion) is really useful at this stage in the learning process. Deleting both groups from the total, however, would have the number of useful phonetics at about 41%.

Some characters have a discernable phonetic, but that phonetic does not prove "useful," because the possibilities of guessing the compound from the phonetic element are slim. Knowing 番 fan will not help you much to predict 播 bo. Knowing 冬 dong may not help you to guess 图 tu, even though the initials are homorganic. Even knowing 北 bei may not make it possible for you to guess 比 bi. In this instance, however, I have chosen to place both in the "recognizable" category of irregular homorganic compounds. How many of the undeveloped independent phonetics prove useful, therefore, will depend on the regularity of the series as well as on frequency of appearance. If we were to delete all those which are irregular from our total, the total number of useable phonetics could decrease to 35%.

Any argument that the number of useful phonetics is less than this figure would have to be based on the usefulness or lack of usefulness of the rules discussed above. I believe that knowing 把 ba, plus the rule that aspirated/unaspirated consonants alternate, will help the student predict the pronunciation of 爬 pa. Or even that knowing 正 zheng and its Minnan literary pronunciation will help the student remember 定 ding.

Reasonable people may differ in any analysis of the usefulness of phonetics. Nevertheless, I would argue that approximately 40% of the characters in the ECR 500 lend themselves to phonetic analysis, and as a result would be more easy to remember. Our conception of what constitutes a useful phonetic may need to be tested and revaluated. But at least it can be tested, not left to the imagination.

All this dramatizes the problems of the rank beginner. He is penalized until he knows enough characters to be able to predict the new ones. Of the first 500 characters less than half have useful phonetics, whereas later (with proper training) the number should rise to sixty or even seventy per cent. I am not sanguine enough to accept Karlgren's estimate (10) that 90% of the commonly-used characters have useful phonetics. Nevertheless, I am convinced that the phonetic approach to reading and writing is indeed a sound approach to learning the language.

Categories of Usable Phonetics

I.	Cognates				
	1. homonyms				
	a.)	in series		72	
	b.)	~undeveloped	42		
	2. homorganic regular				
	a.)	in series		42	
	b.)	~undeveloped	17		
	3. homorganic irregular				
	a.)	recognizable		29	
	b.)	~undeveloped	5		
	c.)	~unrecognizable	15	---	143
II.	Consonant Alterations				
	zh/ z, d (t), J	10			
	ch/ q	1			
	sh/ x	8			
	g/ J	3		29	172
III.	Consonant Cluster Alterations				
	mw/ m, w	4			
	ml/ l	1			
	jl. gl/ l	7			
	nz/ n, er	2		14	186
IV.	Consonant/Semivowel Alterations				
	consonant in compound only	14			
	consonant in phonetic only	8		28	286
V.	Undeveloped				
	in series		143		
	irregular		18		
	no phonetic		57		
Total developed and undeveloped					
	useful phonetics				286 (41%)
	undeveloped		297	(59%)	
Total characters			583	(100%)	

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November, 1985

Footnotes

1. John DeFrancis, The Chinese Language, Fact and Fantasy (Honolulu:

Univ. of Hawaii Press, 1984), p. 85.

2. Ibid., p. 108.

3. Ibid., p. 107.

4. Ibid., p. 110.

5. L. Wieger, S. J. Chinese Characters, their origin, etymology, history, classification and signification. A thorough study from Chinese documents. Trans. into English by L. Davrout, S. J. Second edition, enlarged and revised according to the 4th French edition. Paragon Book Reprint Corp., N. Y., 1965, pp. 387-588.

6. Bernard Karlgren, Analytic Dictionary of Chinese and Sino-Japanese. Dover Publishing, N. Y., 1974.

7. DeFrancis, The Chinese Language, p. 188.

8. Soothill's classification of the phonetics is used in Fenn's popular Five Thousand (Character) Dictionary. According to Karlgren (Analytic Dictionary, p. 4) "Soothill's Pocket dictionary (many editions), though a very good little extract from Giles as far as phraseology is concerned, is very much inferior to both Callery and Wieger from a scientific point of view and for a systematic study of the script."

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10. Bernard Karlgren, Grammata Serica, script and phonetics in Chinese and Sino-Japanese, reprinted from the Bulletin of the Museum of Far Eastern Antiquities Stockholm, Number 12, 1940. (Taipei: Ch'eng-wen Pub. Co., 1966).

11. DeFrancis, The Chinese Language, p. 98.

12. Robert A. Peters, A Linguistic History of English (N. Y.: Houghton Mifflin Co., 1968), p.48.

13. B. Karlgren, Analytical Dictionary, p. 4.

14. Huang Borong, Liao Xudong (ed.), Xiandai Hanyu (2 vols., Kansu: People's Pub. Co., 1981), I, p. 38.

15. Francis D. M. Dow, An Outline of Mandarin Phonetics (Canberra: Australian National Univ. Press, 1972), p. 49.

16. Putonghua Minnan fanyuan cidian (Shanghai: Fujian People's Pub. Co., 1982) is the source for the Minnan romanization and literary pronunciations.

17. B. Karlgren, Analytic Dictionary, pp. 17-18.

18. B. Karlgren, Analytic Dictionary, p. 4.

HOMONYMS IN SERIES

071.	巴	ba	040	227	00078	1.0	30.00	
072.	吧	ba	030	058	00078	1.0	37.02	
073.	把	ba	004	055	00078	1.0	13.12	
074.	爸	ba	008	100	00078	1.0	14.02	
144.	白	bai	100	150	00143	1.0	10.00	
145.	百	bai	100	150	00143	1.0	20.01	
077.	马	ma	107	075	00552	1.0	37.11	
078.	吗	ma	030	058	00552	1.0	03.03	
079.	妈	ma	030	073	00552	1.0	14.03	
080.	玛	ma	000	000	00552	1.0	10.00	
067.	门	men	100	040	00301	1.0	00.00	
068.	们	men	000	021	00301	1.0	03.01	
102.	方	fang	070	005	00056	1.0	24.14	
259.	放	fang	070	005	00056	1.0	33.07	
452.	访	fang	140	010	00056	1.0	41.10	15
240.	弟	di	110	024	00304	2.0	34.02	
432.	第	di	110	024	00304	2.0	32.14	
005.	那	na	103	034	00232	2.0	07.04	
000.	哪	na	030	050	00232	2.0	00.03	
007	娜	na	103	034	00232	2.0	10.00	
020.	两	liang	001	002	00370	2.0	13.10	
300.	辆	liang	150	100	00370	2.0	33.00	
300.	领	ling	101	170	00135	2.0	40.17	
473.	零	ling	173	204	00135	2.0	20.02	09
113.	字	zi	040	045	00033	3.0	00.03	
112.	子	zi	030	074	00033	3.0	11.05	02
044.	正	zheng	077	102	00107	4.0	40.01	
370.	整	zheng	000	102	00107	4.0	41.13	
033.	中	zhong	002	105	00052	4.0	00.00	
302.	钟	zhong	107	147	00052	4.0	21.03	
030.	主	zhu	003	000	00115	4.0	41.10	
400.	注	zhu	005	040	00115	4.0	20.17	
400.	住	zhu	000	021	00115	4.0	41.00	
020.	十	shi	024	012	00010	4.0	07.07	
233.	士	shi	033	040	00010	4.0	30.00	
235.	世	shi	001	002	00157	4.0	12.00	
317.	使	shi	000	021	X0005	4.0	24.00	
000.	事	shi	000	002	X0077	4.0	35.04	
001.	人	ren	000	023	X0030	4.0	00.05	
451.	认	ren	000	010	X0030	4.0	25.14	14
104.	几	ji	010	030	00002	5.0	10.02	
401.	机	ji	075	004	00002	5.0	32.00	
213.	加	jia	010	020	00100	5.0	20.03	
200.	架	jia	075	004	00100	5.0	13.05	
020.	介	jie	042	000	00042	5.0	31.11	
170.	界	jie	102	142	00042	5.0	12.00	
200.	斤	jin	102	115	00040	5.0	22.04	
200.	近	jin	102	047	00040	5.0	24.00	

493.	气	qi	884	189	88515	5.8	34.85					
494.	汽	qi	885	848	88515	5.8	32.89					
482.	清	qing	885	848	88337	5.8	25.87					
483.	请	qing	149	818	88337	5.8	48.18					
484.	情	qing	881	841	88337	5.8	31.13					
423.	相	xiang	189	894	88445	5.8	34.84					
424.	想	xiang	881	981	88445	5.8	28.81					
435.	箱	xiang	118	178	88445	5.8	41.83	16				
248.	刚	gang	818	817	88388	6.8	35.11					
384.	钢	gang	187	147	88388	6.8	11.88					
497.	哥	ge	838	858	88138	6.8	34.81					
498.	歌	ge	878	128	88138	6.8	35.18					
584.	户	hu	883	888	88883	6.8	35.15					
585.	护	hu	884	855	88883	6.8	38.85					
194.	花	hua	148	858	88884	6.8	42.81					
195.	华	hua	888	812	88884	6.8	41.88	08				
134.	右	you	838	814	X8258	7.8	28					
136.	友	you	828	814	X8249	7.8	11.14					
138.	有	you	874	814	X8249	7.8	18.81					
281.	元	yuan	818	811	88897	7.8	28.85					
838.	园	yuan	831	858	88897	7.8	23.13					
282.	远	yuan	182	847	88897	7.8	24.85	06				
115.	安	an	848	845	88178	8.8	88.85					
116.	按	an	884	855	88178	8.8	38.11	02	72	72	14.3%	14.3%

HOMONYMNS (PHONETIC/COMPOUND) UNDEVELOPED

443.	帮	bang	178	857	88232	1.81	38.15	
478.	病	bing	184	127	88158	1.81	28.88	
276.	饭	fan	184	888	88855	1.81	21.88	
338.	慢	man	881	841	88835	1.81	25.13	
192.	苹	ping	148	858	88151	1.81	22.83	05
314.	但	dan	889	821	88182	2.81	35.18	
385.	锻	duan	187	147	88485	2.81	18.83	
297.	烈	lie	888	888	88228	2.81	48.11	
289.	楼	lou	875	894	88831	2.81	27.88	
488.	糖	tang	118	159	88572	2.81	22.85	
388.	庭	ting	853	844	88385	2.81	41.11	06
358.	操	cao	884	855	88784	3.81	18.88	
288.	彩	cai	859	883	88482	3.81	18.13	
325.	赛	sai	848	845	88538	3.81	28.85	03
299.	照	zhao	888	888	88185	4.81	34.83	
218.	唱	chang	838	858	88322	4.81	35.88	
328.	窗	chuang	118	128	K1285	4.81	35.14	
382.	视	shi	147	887	K8882	4.81	14.88	
458.	试	shi	149	818	88238	4.81	38.81	
388.	熟	shu	888	898	88844	4.81	25.88	06

483.	极	Ji	075	094	00048	5.01	37.01					
319.	假	Jia	088	021	00427	5.01	33.00					
484.	检	Jian	075	094	00728	5.01	39.02					
193.	节	Jie	148	050	K1007	5.01	21.12					
358.	经	Jing	128	077	00282	5.01	20.12					
230.	期	qi	074	118	00327	5.01	23.07					
490.	骑	qi	187	075	00328	5.01	33.02					
287.	球	qiu	095	088	00283	5.01	22.00	08				
501.	挂	gua	025	055	00389	8.01	41.00					
277.	馆	guan	184	088	00378	8.01	17.03					
339.	惯	guan	001	041	K0445	8.01	30.07					
310.	候	hou	000	021	00444	8.01	21.11	04				
220.	喂	wei	030	050	00488	7.01	30.03					
320.	舞	wu	138	020	00718	7.01	40.04					
300.	弯	wan	181	170	00497	7.01	19.10					
287.	样	wang	075	094	00248	7.01	09.00					
310.	围	wi	181	170	00279	7.01	40.00					
457.	谓	wi	149	010	00110	7.01	24.00					
400.	译	wi	149	010	00738	7.01	25.11					
003.	邮	wou	103	034	00170	7.01	27.13					
307.	预	wu	101	170	00000	7.01	10.02					
007.	运	wun	000	047	00100	7.01	30.04	10	42	114	22.7%	14.3%
HOMORGANIC IN SERIES												
075.	爬	pa	007	110	00070	1.021	37.07					
250.	旁	pang	070	005	00050	1.021	20					
201.	乒	ping	000	004	K0305	1.021	20.10	03				
201.	才	cai	000	002	00030	3.021	31.10					
251.	在	zai	132	014	00030	3.021	10.05	02				
302.	张	zhang	057	071	00323	4.021	13.00					
301.	长	chang	103	004	00323	4.021	37.00					
440.	掌	zhang	004	130	00301	4.021	40.13					
445.	常	chang	050	130	00301	4.021	17.01					
103.	治	zhi	005	040	00127	4.021	30.00					
170.	始	shi	030	073	00127	4.021	31.10					
331.	志	zhi	001	040	K1210	4.021	12.02					
031.	上	shang	001	010	K0055	4.021	10.00					
453.	让	rang	000	010	K0055	4.021	40.10					
223.	时	shi	000	103	K0037	4.021	21.10					
000.	日	ri	072	103	K0037	4.021	23.05					
047.	是	shi	072	213	K0000	4.021	07.02	12				
301.	见	Jian	147	107	00259	5.021	20.10					
303.	现	xian	005	000	00259	5.021	21.01					
200.	校	xiao	075	094	00103	5.021	12.12					
300.	较	Jiao	150	100	00103	5.021	30.00					
304.	觉	Jue	147	107	00733	5.021	21.14					
114.	学	xue	030	074	00733	5.021	05.01					
210.	新	xin	000	115	00040	5.021	15.01	07				

458.	该	gai	149	818	88197	6.821	29.16					
118.	孩	hai	839	874	88197	6.821	41.85					
383.	跟	gen	157	198	88219	6.821	24.81					
148.	很	hen	888	882	88219	6.821	83.84					
131.	工	gong	848	848	88824	6.821	18.84					
327.	空	kong	118	128	88824	6.821	42.85					
352.	红	hong	128	877	88824	6.821	19.84					
388.	故	gu	888	113	88132	6.821	35.83					
198.	苦	ku	148	858	88132	6.821	41.15					
448.	科	ke	115	149	K8878	6.821	37.88					
154.	和	he	115	149	K8878	6.821	11.12					
883.	口	kou	838	858	K8419	6.821	82.83					
374.	后	hou	838	822	88188	6.821	27.18	13				
284.	完	wan	848	845	88314	7.821	35.81					
283.	院	yuan	178	833	88314	7.821	18.89					
285.	玩	wan	895	888	88887	7.821	25.16					
815.	五	wu	887	882	K1288	7.821	81.85					
158.	语	yu	149	818	K1281	7.821	85.88	05	42	156	31%	22.7%
HOMORGANIC UNDEVELOPED												
384.	跑	pao	157	198	88145	1.822	25.83	01				
159.	词	ci	149	818	88159	3.822	88.88	01				
353.	纸	zhi	128	877	88882	4.822	11.83					
375.	知	zhi	111	148	88334	4.822	42.92					
355.	绍	shao	128	877	88185	4.822	31.12					
321.	室	shi	848	845	88188	4.822	12.14					
188.	谁	shui	149	818	88344	4.822	12.18					
425.	睡	shui	189	841	88435	4.822	21.13	06				
119.	教	jiao	888	113	88278	5.822	12.13					
189.	姐	jie	838	873	88118	5.822	38.81					
583.	搜	jie	884	855	88331	5.822	33.11					
848.	起	qi	158	189	88814	5.822	17.88					
388.	钱	qian	187	147	88333	5.822	28.83					
377.	喜	xi	838	848	88888	5.822	28	06				
324.	客	ke	848	845	88228	6.822	41.88					
478.	况	kuang	815	888	88123	6.822	31.14					
177.	黄	huang	281	893	88222	6.822	19.87	03	17	173	34%	22.7%
HOMORGANIC IRREGULAR, RECOGNIZABLE AND IN SERIES												
283.	比	bi	881	123	88877	1.81	28.84					
284.	北	bei	821	838	88877	1.831	18.88					
282.	乓	pang	888	884	K8385	1.831	28.11					
488.	买	mai	122	885	88887	1.831	28.12					
488.	卖	mai	154	812	88887	1.831	31.88	05				
821.	大	da	837	852	K8852	2.831	81.83					
822.	太	tai	837	852	K8852	2.831	15.88					

498.	冬	dong	015	005	00188	2.031	32.17					
479.	疼	tong	104	127	00188	2.031	29.14					
001.	他	ta	009	021	00037	2.031	04.07					
002.	她	ta	038	073	00037	2.031	11.02					
349.	提	ti	004	055	00478	2.031	31.10					
300.	题	ti	101	213	00478	2.031	10.02					
120.	努	nu	019	028	X0074	2.031	15.11					
474.	冷	leng	015	008	00135	2.031	30.08	10				
102.	什	shen	009	021	00010	4.031	05.03	01				
099.	进	jin	008	047	00049	5.031	24.02					
100.	讲	jiang	008	010	00049	5.031	42.00	02				
212.	告	gao	030	050	00202	6.031	30.05					
217.	高	gao	109	210	00544	6.031	25.17					
244.	刮	gua	010	177	00227	6.031	30.10					
150.	话	hua	140	010	00227	6.031	30.01					
100.	课	ke	140	010	00373	6.031	10.10					
490.	可	ke	030	050	00130	6.031	20.13					
254.	块	kuai	032	040	00053	6.031	20.04					
330.	快	kuai	001	041	00053	6.031	25.05					
211.	号	hao	030	050	00122	6.031	23.04	09				
507.	据	wo	004	055	00490	7.031	33.00					
500.	屋	wu	044	007	00490	7.031	14.04	02	29	202	40%	20.4%
HOMORGANIC IRREGULAR, RECOGNIZABLE BUT UNDEVELOPED												
107.	药	yao	140	050	X1340	7.031	20.03					
333.	意	yi	001	211	00730	7.031	20.10					
101.	英	ying	140	050	00100	7.031	11.11					
105.	演	yan	005	040	00001	7.031	40.00					
200.	迎	ying	102	047	00073	7.031	40.15	05	05	207	41%	20.4%
HOMORGANIC IRREGULAR, UNRECOGNIZABLE												
509.	播	bo	004	055	00070	1.032	35.00					
510.	翻	fan	124	103	00070	1.032	25.10					
004.	部	bu	103	034	00401	1.032	31.07					
502.	排	pai	004	055	00303	1.032	20.00	04				
347.	打	da	004	055	00011	2.032	20.07					
040.	图	tu	031	050	00000	2.032	12.05					
171.	男	nan	102	142	X0900	2.032	15.14	03				
477.	准	zhun	015	000	00344	4.032	40.02					
200.	热	re	006	000	00001	4.032	31.17	02				
152.	叫	jiao	030	050	00004	5.032	00.07					
315.	借	jie	009	021	00350	5.032	17.04					
307.	错	cuo	107	147	00350	5.032	35.00					
207.	就	jiu	043	009	00330	5.032	31.05	04				
243.	刻	ke	010	017	00107	6.032	21.05					

118.	或	huo	082	101	00384	8.032	10.05	02	15	222	44%	28.4%

ZH/Z CONSONANT ALTERATION

140.	脏	zang	100	110	K1203	4.3	15.09					
335.	怎	zen	081	081	00102	4.3	09.07					
220.	昨	zuo	072	103	00102	4.3	20.02					
310.	作	zuo	009	021	00102	4.3	00.01	04				

ZH/D,T CONSONANT ALTERATION

214.	店	dian	053	044	00104	4.4	10.12					
295.	点	dian	203	008	00104	4.4	21.02					
370.	站	zhan	117	120	00104	4.4	33.04					
040.	定	ding	040	045	00107	4.4	20.20					
170.	重	zhong	100	004	00437	4.4	30.10					
340.	懂	dong	001	041	00437	4.4	35.02					
002.	都	dou	103	034	00422	4.4	17.07					
001.	者	zhe	125	002	00422	4.4	10.00					
305.	跳	tiao	157	100	00170	4.4	40.05	09				

ZH/J, CH/Q CONSONANT ALTERATION

400.	净	jing	005	040	00324	4.5	15.03					
407.	静	jing	174	304	00324	4.5	17.12					
151.	只	zhi	030	050	00111	4.5	17.00					
430.	积	ji	115	140	00111	4.5	41.10					
405.	吃	chi	030	050	K0332	4.5	21.07					
403.	支	zhi	005	012	00045	4.5	13.11					
400.	技	ji	004	055	00045	4.5	30.03	07				

SH/X CONSONANT ALTERATION

057.	少	shao	042	070	00000	5.4	15.10					
050.	小	xiao	042	070	K0700	5.4	04.00					
450.	谢	xie	140	010	00500	5.4	20.14					
043.	生	sheng	100	004	00154	5.4	00.05					
222.	星	xing	072	103	00154	5.4	23.00					
140.	行	xing	144	002	00203	5.4	32.02	06				

C/J CONSONANT ALTERATION

402.	柜	gui	075	004	00110	0.2	41.02					
150.	街	jie	144	002	00224	0.2	33.01					
245.	剧	ju	010	017	00345	0.2	27.12	03	29	251	50%	34%

MW/M, W CLUSTER ALTERATION

337.	忙	mang	001	041	00035	1.3	03.02					
100.	妹	mei	030	073	00107	1.3	30.02					
227.	晚	wan	072	103	00205	1.3	10.00					
009.	问	wen	030	040	00301	1.3	10.13					
175.	留	liu	102	142	00130	2.3	11.01	05				

JL,GL/L CLUSTER ALTERATION

100.	蓝	lan	140	050	00772	5.2	15.05					
305.	览	lan	147	107	00772	5.2	17.00					
437.	蓝	lan	110	170	00772	5.2	20.00					

292.	练	lian	120	077	00420	5.2	10.11					
293.	炼	lian	080	083	00420	5.2	10.04					
286.	凉	liang	085	088	00336	5.2	36.07					
382.	路	lu	157	198	K0577	5.2	37.08	07				
NZ/N. ER CLUSTER ALTERATION												
005.	你	ni	009	021	K0014	8.71	02.01					
008.	您	nin	001	001	K0014	8.71	20.03	02	14	265	52.6%	37%
SEMIVOWEL PHONETIC/CONSONANT COMPOUND												
003.	地	di	032	040	00037	7.70	12.04					
004.	也	ye	005	005	00037	7.70	05.07					
455.	谈	tan	140	010	00410	7.70	32.13					
300.	踢	ti	157	190	00305	7.70	22.00					
143.	易	yi	072	103	00305	7.70	15.00					
220.	暖	nuan	072	103	00505	7.70	30.05					
303.	铅	qian	107	147	00109	7.70	11.00					
250.	船	chuan	137	102	00109	7.70	32.11					
250.	场	chang	032	040	00402	7.70	10.10					
431.	笑	xiao	110	170	00092	7.70	41.04					
204.	烧	shao	000	003	00710	7.70	20.10					
270.	舒	shu	135	023	00000	7.70	20.05					
157.	说	shuo	140	010	00313	7.70	10.04					
070.	阅	yue	100	040	00313	7.70	17.05	14				
CONSONANT PHONETIC/SEMIVOWEL COMPOUND												
500.	椅	yi	075	004	00320	7.71	11.10					
200.	影	ying	050	003	00330	7.71	17.02					
205.	京	jing	000	000	00330	7.71	10.07					
370.	用	yong	101	010	00052	7.71	32.12	06	20	285	56.7%	41%
000.	阿	a	170	033	00130	0.04	11.00					
000.	啊	a	030	050	00130	0.04	30.02					
UNDEVELOPED IN SERIES												
010.	八	ba	012	024	00000	1.01	01.01					
050.	半	ban	024	003	00144	1.01	21.04					
412.	办	ban	100	020	00700	1.01	27.05					
203.	本	ben	075	004	00147	1.01	11.04					
500.	遍	bian	102	047	00473	1.01	41.14					
300.	表	biao	145	101	00300	1.01	30.00					
242.	别	bie	010	017	K0720	1.01	24.11					
001.	不	bu	001	005	00070	1.01	01.02					
045.	步	bu	077	102	K0750	1.01	25.04					
100.	用	peng	074	110	00307	1.01	11.13					
300.	票	piao	113	100	00042	1.01	10.17					
422.	冒	mao	072	104	00402	1.01	20.00					
303.	毛	mao	002	101	00070	1.01	10.02					
121.	没	mei	005	040	K0037	1.01	13.01					
105.	面	mian	170	002	00400	1.01	37.04					
372.	名	ming	030	004	00230	1.01	00.00					
220.	明	ming	072	103	K0034	1.01	23.02					
107.	民	min	003	227	00137	1.01	13.02					

421.	目	mu	109	141	K0044	1.01	35.	
413.	发	fa	041	072	00075	1.01	29.09	
102.	法	fa	005	040	00119	1.01	12.07	
051.	分	fen	018	024	00058	1.01	20.07	
491.	风	feng	102	121	00439	1.01	36.11	
414.	复	fu	035	020	00442	1.01	10.01	
024.	夫	fu	037	052	00059	1.01	10.03	
240.	服	fu	074	110	K0043	1.01	24.10	26
433.	答	da	110	170	K0054	2.01	10.15	
444.	带	dai	050	057	00040	2.01	37.05	
241.	到	dao	010	171	K0075	2.01	31.09	
147.	得	de	000	002	K0000	2.01	25.01	
430.	等	deng	110	170	00230	2.01	30.07	
055.	典	dian	012	024	00300	2.01	12.03	
173.	电	dian	000	142	00153	2.01	14.05	
101.	丁	ding	001	002	00011	2.01	11.00	
201.	东	dong	000	227	00405	2.01	20.10	
350.	度	du	053	044	00404	2.01	39.00	
371.	多	duo	030	004	00230	2.01	15.04	
450.	特	te	003	110	00230	2.01	40.10	
023.	天	tian	037	000	K0000	2.01	00.02	
370.	同	tong	030	010	00240	2.01	10.12	
100.	头	tou	000	052	00004	2.01	20.13	
230.	南	nan	024	012	00400	2.01	27.07	
070.	呢	ne	030	050	00140	2.01	20.04	
100.	能	neng	130	037	00554	2.01	20.12	
230.	年	nian	051	020	00010	2.01	23.01	
002.	女	nu	030	073	K0075	2.01	15.15	
020.	来	lai	000	004	00374	2.01	25.02	
232.	老	lao	125	002	K0515	2.01	00.01	
100.	劳	lao	140	050	00004	2.01	30.13	
111.	了	le	000	005	K0545	2.01	20.01	
007.	力	li	010	020	K0523	2.01	15.12	
100.	两	li	114	000	00020	2.01	24.04	
252.	里	li	000	105	00207	2.01	24.13	
330.	丽	li	100	002	00033	2.01	10.00	
200.	旅	lu	070	005	K0507	2.01	32.01	
407.	录	lu	000	070	K0574	2.01	10.00	30
221.	早	zau	072	103	K1037	3.01	10.15	
420.	自	zi	132	100	K1001	3.01	33.03	
040.	走	zou	150	100	K1102	3.01	20.01	
301.	足	zu	157	100	00310	3.01	22.07	
253.	坐	zuo	032	040	00300	3.01	32.04	
200.	参	can	020	037	00052	3.01	20.02	
475.	次	ci	070	000	00044	3.01	32.10	
013.	三	san	001	002	K0700	3.01	00.00	
332.	思	si	001	142	00477	3.01	31.10	
454.	诉	song	140	010	00112	3.01	30.00	
000.	送	song	102	047	K0035	3.01	33.05	
322.	宿	su	040	045	00013	3.01	13.00	12

397.	展	zhan	044	067	K1184	4.81	31.84	
343.	着	zhe	123	157	K1187	4.81	41.81	
344.	真	zhen	109	112	00589	4.81	25.15	
285.	桌	zhuo	075	094	00339	4.81	11.09	
133.	差	cha	048	157	00588	4.81	21.08	
284.	查	cha	075	094	00428	4.81	39.83	
481.	厂	chang	088	013	00863	4.81	27.11	
255.	城	cheng	032	049	00179	4.81	24.83	
041.	出	chu	017	081	00117	4.81	31.08	
058.	楚	chu	075	156	00738	4.81	25.08	
329.	穿	chuan	116	128	K0208	4.81	29.19	
487.	床	chuang	053	044	00041	4.81	13.09	
225.	春	chun	072	138	00888	4.81	36.84	
084.	山	shan	046	088	00025	4.81	26.84	
274.	舍	she	135	023	00227	4.81	13.87	
488.	社	she	113	087	00832	4.81	31.83	
234.	声	sheng	128	049	00804	4.81	37.18	
275.	食	shi	184	217	K0891	4.81	27.83	
441.	市	shi	058	089	K0884	4.81	32.18	
442.	师	shi	058	083	00581	4.81	08.82	
282.	术	shu	075	094	00158	4.81	38.84	
485.	树	shu	075	094	00888	4.81	37.88	
086.	水	shui	085	125	K0924	4.81	22.81	
328.	容	rong	048	045	00542	4.81	15.87	24
323.	家	jia	048	045	00516	5.81	14.81	
278.	建	jian	054	038	00438	5.81	41.17	
448.	角	jiao	146	201	K0598	5.81	28.88	
449.	解	jie	148	201	00725	5.81	31.28	
271.	今	jin	089	023	00847	5.81	09.81	
819.	九	jiu	085	087	00885	5.81	04.85	
215.	句	ju	038	028	K0419	5.81	25.12	
218.	局	ju	044	067	00288	5.81	27.14	
388.	军	jun	159	018	00438	5.81	36.82	
486.	齐	qi	218	188	00771	5.81	41.14	
247.	前	qian	018	024	00431	5.81	27.89	
257.	墙	qiang	032	049	00755	5.81	41.87	
438.	秋	qiu	115	149	00433	5.81	36.83	
231.	去	qu	028	133	00118	5.81	09.83	
188.	西	xi	148	188	K0778	5.81	28.11	
351.	系	xi	128	077	K0125	5.81	18.18	
427.	息	xi	081	188	00534	5.81	23.11	
032.	下	xia	001	018	K0134	5.81	21.89	
428.	夏	xia	035	085	K0138	5.81	32.18	
042.	先	xian	018	029	00282	5.81	32.28	
311.	休	xiu	089	021	00285	5.81	23.18	
472.	雪	xue	173	284	00817	5.81	36.89	22
483.	干	gan	051	011	00822	6.81	15.82	
354.	给	gei	128	077	00188	6.81	23.89	
052.	公	gong	012	024	00888	6.81	23.12	
053.	共	gong	012	093	00225	6.81	28.89	
478.	鼓	gu	287	224	K0429	6.81	48.12	

482.	厂	guang	053	044	00000	6.01	35.05					
179.	果	guo	075	004	00373	6.01	22.02					
181.	汉	han	008	040	00009	6.01	05.05					
286.	黑	hei	203	223	00070	6.01	19.00					
038.	回	hui	031	059	00211	6.01	10.14					
273.	会	hui	009	023	00730	6.01	20.00	11				
373.	外	wai	038	004	X0775	7.01	13.04					
035.	王	wang	006	008	X1200	7.01	12.00					
003.	文	wen	007	004	00000	7.01	12.00					
034.	午	wu	024	020	X1270	7.01	10.01					
420.	亚	ya	007	100	00411	7.01	30.00					
155.	言	yan	140	105	X0234	7.01	10.00					
107.	要	yao	146	006	00403	7.01	20.13					
100.	已	yi	040	072	X0170	7.01	20.11					
100.	以	yi	000	023	X0101	7.01	20.14					
304.	衣	yi	113	101	X0105	7.01	10.03					
410.	医	yi	104	015	00010	7.01	20.02					
142.	音	yin	100	211	00400	7.01	10.07					
350.	应	ying	053	044	00707	7.01	20.15					
471.	雨	yu	173	204	X1324	7.01	30.00					
410.	员	yuan	030	050	00500	7.01	30.01					
010.	月	yue	074	110	X1347	7.01	23.03					
410.	乐	yue	075	004	00240	7.01	40.00	17				
012.	二	er	007	011	X0000	8.01	00.07	01	143	428	85.1%	41%
IRREGULAR												
104.	每	mei	000	020	00204	1.9	32.15	01				
153.	听	ting	030	050	00040	2.9	10.05					
272.	念	nian	001	001	00047	2.9	00.04					
447.	堂	tang	032	130	00040	2.9	27.02					
430.	躺	tang	150	200	00301	2.9	42.04	04				
305.	村	chen	145	120	00031	3.9	20.00					
120.	掌	ji	030	140	00033	3.9	30.12					
030.	些	xie	007	011	X1000	3.9	17.11	03				
300.	收	shou	000	113	00004	4.9	35.13					
301.	针	zhen	107	147	00010	4.9	30.05					
120.	助	zhu	010	020	00110	4.9	30.10	03				
313.	件	jian	000	021	X0073	5.9	10.01	01				
125.	观	guan	000	035	00041	6.9	31.02					
334.	感	gan	007	001	00740	6.9	20.07					
104.	海	hai	005	040	00204	6.9	32.00					
340.	找	zhao	004	055	X0410	6.9	30.04	04				
345.	我	wo	002	101	X0410	7.9	05.00					
130.	育	yu	074	110	X1130	7.9	23.00	02	10	446	00.7%	41%

NO PHONETIC

206.	班	ban	005	008	00000	1.02	15.13	
348.	报	bao	008	055	00000	1.02	07.05	
172.	备	bei	008	005	00000	1.02	40.03	
434.	笔	bi	118	178	00000	1.02	11.07	
005.	边	bian	102	047	00000	1.02	27.04	
103.	片	pian	001	114	00000	1.02	31.01	
103.	么	ma	200	004	00000	1.02	05.04	
402.	飞	fei	103	007	00000	1.02	32.07	
230.	丰	feng	002	003	00000	1.02	40.07	09
415.	具	dao	041	072	00000	2.02	40.10	
270.	道	dao	102	047	00000	2.02	42.03	
140.	的	de	100	150	00000	2.02	12.11	
130.	动	dong	000	020	00000	2.02	30.14	
123.	对	dui	000	035	00000	2.02	25.00	
009.	队	dui	170	033	00000	2.02	35.12	
312.	体	ti	000	021	00000	2.02	04.02	
120.	难	nan	000	035	00000	2.02	15.05	
300.	礼	li	113	007	00000	2.02	27.01	
010.	六	liu	012	000	00000	2.02	04.03	10
417.	杂	za	000	004	00000	3.02	12.01	
300.	再	zai	013	002	00000	3.02	20.15	
127.	最	zui	073	103	00000	3.02	32.10	
132.	左	zuo	040	014	00000	3.02	20	
027.	从	cong	000	023	00000	3.02	24.07	
100.	色	se	130	027	00000	3.02	10.14	
014.	四	si	031	050	00000	3.02	00.00	07
004.	这	zhe	000	047	00000	4.02	07.01	
307.	车	che	150	100	00000	4.02	32.00	
210.	商	shang	030	000	00000	4.02	10.11	
122.	设	she	140	010	00000	4.02	41.10	
420.	身	shen	150	200	00000	4.02	04.01	
341.	手	shou	004	111	00000	4.02	33.10	
050.	书	shu	073	003	00000	4.02	07.03	07
224.	间	jian	100	040	00000	5.02	27.00	
141.	旧	jiu	000	103	00000	5.02	15.10	
017.	七	qi	001	002	00000	5.02	04.04	
357.	庆	qing	100	044	00000	5.02	40.00	
000.	习	xi	124	000	00000	5.02	05.02	
107.	写	xie	000	010	00000	5.02	00.02	
054.	兴	xing	134	024	00000	5.02	25.10	07
037.	国	guo	031	050	00000	6.02	00.04	
025.	个	ge	002	023	00000	6.02	13.03	
405.	关	guan	000	024	00000	6.02	10.10	
000.	过	guo	102	047	00000	6.02	37.03	
404.	开	kai	100	051	00000	6.02	31.15	
342.	看	kan	100	141	00000	6.02	10.03	
002.	还	hai	102	047	00000	6.02	17.10	

117.	好	hao	038	073	00000	8.82	82.82					
174.	画	hua	000	038	00000	8.82	87.66					
124.	欢	huan	000	035	00000	8.82	40.14					
005.	火	huo	006	003	00000	8.82	32.05	11				
101.	为	wei	007	001	00000	7.82	24.12					
419.	业	ye	075	040	00000	7.82	32.03					
411.	义	yi	004	025	00000	7.82	41.28					
011.	一	yi	001	002	00000	7.82	01.04	04				
137.	爱	ai	007	116	00000	8.82	41.12					
105.	儿	er	010	020	00000	8.82	09.04	02	57	503	100%	41%